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ABSTRACT

Compared with other media, computer-mediated communication (CMC) is a relatively new mode of communication that has emerged in the past two decades. In the past decade, there has been a growing body of research on CMC. There are two dominant models of CMC: the task-oriented and the social-emotion-oriented. This review discusses, compares, and contrasts several major aspects of these two models. Results indicate that both models share similarities in three areas: research methods, participants' characteristics, and task characteristics. However, the models have differences in three other areas: theoretical foundations, technology and experimental duration in research methodology, and major findings. Suggestions for future CMC research are proposed in order to more clearly identify the nature of CMC environments. (Contains 93 references.) (Author/MES)

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A Comparison of the Task-oriented Model and the Social-emotion-oriented Model in Computer-mediated Communication

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Abstract

Compared with other media, computer-mediated communication (CMC) is a relatively new mode of communication that has emerged in the past two decades. In recent decade, there has been a growing body of research on CMC. There are two dominant models of computer-mediated communication: the task-oriented and the social-emotion-oriented. This review discusses, compares, and contrasts several major aspects of these two models. Results indicate that both models share similarities in three areas: research methods, participants' characteristics, and task characteristics. However, both models have differences in three other areas, including theoretical foundations, technology and experimental duration in research methodology, and major findings. Suggestions for future CMC research are proposed in order to more clearly identify the nature of CMC environments.

A Comparison of the Task-oriented Model and the Social-emotion-oriented Model in Computer-mediated Communication

Compared with other media, computer-mediated communication (CMC) is a new medium of human communication that has emerged largely in the past decades. Since CMC represents a different medium of human communication and is quite different from our traditional face-to-face (FtF) communication, it has been described as an "altered state of communication," including altered physical environments, altered time and space, and altered structures in communication (Vallee, Johansen, & Sprangler, 1975). CMC systems were initially used to facilitate and coordinate emergency tasks among geographically distributed individuals or groups (Hiltz & Turoff, 1978; Rapaport, 1991). Now, CMC offers many kinds of services, including asynchronous e-mail, computer conferencing, bulletin boards, electronic databases, facsimile, teletex, videotex (Bates, 1986; Rice, 1990), as well as voice messaging (Gluck, Coliz, & Rosenbaum, 1991).

CMC has a variety of advantages over other media. CMC combines the interactivity and group communication features of FtF communication; time and place independence and mediated communication features of distance education (Kearsley, 1993), as well as new modes of communication storage and retrieval (Culnan & Markus, 1987). Moreover, since CMC systems can be programmed to automatically collect transcripts of the message flows, contents, and usage at various levels, a rich source of data can be accumulated compared with FtF or other media channels (Rice, 1990).

CMC has been employed in many fields, including political forums (e. g., Hill & Hughes, 1997), educational computer conferencing (e. g., Harasim, 1986, 1987; Iseke-

Barnes, 1996), cooperative research (e. g., Ginther, 1993; Walther, 1997), organizational communication (e. g., Rice, 1986, 1987a; Steinfield, 1986, 1992), social support communication (e. g., Weinberg, Schmale, Uken, & Wessel, 1995), and interpersonal communication (e. g., Kraut, Patterson, Lundmark, Kiesler, Mukopadhyay, & Scherlis, 1998). Therefore, there has accumulated a growing body of research in many fields that indicates that there are two basically separate dimensions—transmission of task communication activities and transmission of the social-emotional communication activities. These dimensions can be categorized within two dominant models: the task-oriented and the social-emotion-oriented models (e. g., Phillips, 1982; Rice, Huges, & Love, 1989).

Many of the earliest studies on CMC environments focused on the task-oriented communication and seldom dealt with CMC's emotional content. Such research indicated that CMC was experienced as less emotional, more businesslike, depersonalized, the task-oriented, and cold. Because the task-oriented nature of CMC has been generally accepted, it remains the focus of most research in the literature (e. g., Connolly, Jessup, & Valacich, 1990; Hiltz, Johnson, & Turoff, 1986; Kiesler, Siegel, & McGuire, 1984). More recent studies have investigated CMC environments from a different perspective and have focused on the other major aspect of CMC environments—the social-emotion-oriented communication (e. g., Lea & Spears, 1991; Parks & Floyd, 1996; Rice, 1987b; Walther, 1992a, 1992b, 1994, 1995, 1996; Walther & Burgoon, 1992). Research on the social-emotion-oriented model indicates that CMC systems can facilitate a moderate degree of the social-emotional content exchange.

This paper is designed to clarify and distinguish the two dominant models in previous CMC research. In the next section, several major aspects of these two models will be discussed, compared, and contrasted. In the last section, suggestions for future CMC research will be proposed.

Models of CMC: The Task-oriented vs. the Social-emotion-oriented

This section involves three parts. First, an overview of the comparison and contrast between the task-oriented model and the social-emotion-oriented model is presented. In terms of the basic assumptions, these two models are quite different. The task-oriented model assumes that CMC lacks nonverbal cues and cannot convey emotions in communication, while the social-emotion-oriented model assumes that CMC users can adapt their linguistic and textual behaviors to convey emotions in communication. Next, three major aspects of these two models will be discussed in terms of previous CMC empirical studies: (a) theoretical foundations, (b) research methodology, and (c) major findings. Finally, similarities and differences of both models will be briefly discussed.

An Overview of Both Models

The following table is designed to present an overview of the above two dominant models in CMC research.

Table 1

An Overview of Two Dominant Models

	The Task-oriented Model	The Social-emotion-oriented Model
Theoretical Foundations	a. Social Presence Theory b. Media/Information Richness Theory c. Social Context Cues Theory	a. Social !nformation Processing Model
Research Methodology (1) Participants	a. Various group sizes. Most groups have three to four members, a few have large group sizes. b. Various characteristics. Some groups are mixed in gender, others have a single gender. Most of the members are new to each other. c. Various settings. Most studies are done in organizations, some are done in school settings. d. Anonymously. Most studies are done anonymously, a few non-anonymously. e. Incentives for participation. Some participants receive course credit, others receive payments or nothing.	a. Various group sizes. Some have three-member groups. Others have very large group sizes b. Various characteristics. Most groups are mixed in gender. Most of the members are new to each other. Some involved regular e-mail users. c. Various settings. Most studies are done in school settings, some are done in organizations. d. Anonymously. Most studies are done anonymously, a few non-anonymously. e. Incentives for participation. Some participants receive course credit, others receive payments or nothing.
(2) Technology	Characteristics: most of the following technologies are synchronous. a. Electronic Brainstorming	Characteristics: most of the following technologies are asynchronous. a. Public Electronic Network

	System (EBS) b. Electronic Information Exchange System (EIES) c. MM Mail Program d. Electronic Meeting Technology (EMT) e. Group Decision Support Systems (GDSS) f. Interactive Converse Program	(PEN) b. Instructional Computer Conferencing System (ICOSY) c. Vaxnotes d. EIES e. Bulletin Board System (BBS) f. Internet g. TeleNex
(3) Procedure Research methods	a. laboratory experiments b. field experiments c. case studies	a. laboratory experiments b. field experiments c. case studies d. surveys
Task characteristics	a. regular decision making b. group problem solving c. idea generation d. choice dilemma problems e. homicide investigation task f. risk decision making	a. decision making b. policy recommendations c. problem solving d. social support work e. sending memos f. topics about a field g. choice dilemma tasks h. controversial topics
Experimental Duration	a. most less than one hour b. a few several weeks	a. a few less than one hour b. most several weeks c. a few from one to two years
Major Results	a. equal participation b. uninhibited behavior c. increased quality of decision d. increased time to reach a decision e. depersonalization	a. social and relational development b. individuation c. impression development d. humor

The task-oriented Model

Theoretical Foundations

The task-oriented model of CMC is primarily based on three theories: Social Presence Theory, Media/Information Richness Theory, and Social Context Cues Theory. According to these three theories, FtF communication has the most social cues and information (such as both verbal and nonverbal cues) and can convey emotions in communication, while CMC communication has the least social cues and information (such as limited to only verbal cues). Therefore, CMC tends to be inherently task-oriented and to lack emotional content in communication.

Social Presence Theory. Social Presence Theory was first proposed by Short, Williams, and Christie (1976). According to Short et al., social presence refers to the extent to which a medium is perceived as conveying the actual physical presence of the communicators. Thus, social presence not only depends on the communication of words, but also on a variety of nonverbal cues such as physical distance, postures, facial expressions, and the like. According to this theory, media vary in their "capacity to transmit information about facial expression, direction of looking, posture, dress and nonverbal, vocal cues" (p. 65). Therefore, from the perspective of Social Presence Theory, CMC environments lack nonverbal cues and are destined to lack emotions.

Media/Information Richness Theory. Media/Information Richness Theory is based on the research of Daft and Lengel (1984, 1986). According to Daft and Lengel, Media/Information Richness Theory refers to the extent to which a medium or information is perceived as rich or lean by the communicators. The communication effect is influenced by the richness of the media or information among the communicators.

According to this theory, information is a key construct for understanding organizational process and structure. Organizations must use information to reduce equivocality and uncertainty in vertical information transfer and for coordinating internal activities. Communication media differ in the richness of information processed. According to this theory, CMC environments have the least rich information, while FtF environments have the most richness among all the media.

Social Context Cues Theory. Social Context Cues Theory is primarily based on work by Kiesler et al. (1984) and Dubrovsky, Kiesler, and Sethna (1991). Social Context Cues Theory refers to the extent to which a medium is perceived as providing social context cues to the communicators. Kiesler et al. (1984) cautioned that CMC has "...(a) a paucity of social context information, and (b) few widely shared norms governing its use" (p. 1126). In addition, according to Dubrovsky et al. (1991), the status hierarchy can regulate group behavior if group members perceive the social order. People perceive the social order through both static and dynamic social context cues. Static cues come from people's appearance. Dynamic cues come from people's behavior, such as frowning with unhappiness and nodding approval. According to this theory, CMC environments have the least social context cues, while FtF environments have the most social context cues in communication.

Because these three theories have similarities, they are all referred to as the "cues-filtered-out" perspective (Culnan & Markus, 1987). From this perspective, nonverbal cues not only regulate social interaction, but also supply valuable information about the communicators. This kind of information is very helpful in forming impressions, in assessing the ways the participants understand and reply to messages and in determining

the truthfulness of the participants' communication. Accordingly, the filtered-out cues affect the communicators in three ways: regulation of social interaction, perception and impression formation, and awareness of the social context of communication. Based on this perspective, all CMC environments could be viewed as less personal and less socially emotional than FtF environments because of the constraints of perceived cues in the interaction.

Research Methodology

Participants. The issue of participants addresses three aspects: user profile, group size, and group structure. User profile refers to the participants' computer experience, group gender composition, and acquaintance with group members. User profile is one of the three essential interacting factors for successful CMC (Nunamaker et al. 1989). Most research addressing user profile variables in the task-oriented communication involved randomly assigned research partners who were, therefore, typically new to each other. Most participants have no experience with CMC. All participants were assigned to either female-only groups (e. g., Dubrovsky et al., 1991; Savicki, Kelly, & Lingenfelter, 1996), male-only groups (e. g., Dubrovsky et al., 1991; Savicki et al., 1996), or mixed-sex groups (e. g., Connolly et al., 1990; Herschel, Cooper, Smith, & Arrington, 1994; Hiltz et al., 1986; Kiesler, Zubrow, Moses, & Geller, 1985; Savicki et al., 1996). Mixed-gender groups were used in most studies. In addition, participants in CMC environments received a short period of training about the use of communication technology before the experiment (e. g., Hiltz et al., 1986).

The second major aspect is group size. Research on the task-oriented communication in CMC environments uses groups of varying sizes. These group sizes

included three-member groups (e. g., Hollingshead, 1996; McGuire et al., 1987; Siegel, Dubrovsky, Kiesler, & McGuire, 1986; Valacich, Dennis, & Nunamaker, 1992; Weisband, 1992), four-member groups(e. g., Connolly et al., 1990), five-member groups (e. g., Hiltz et al., 1986), six-member groups (e. g., Savicki et al., 1996), and nine-member groups (Valacich et al., 1992).

The third major aspect is group structure, including communication settings, incentives for participation, and the anonymity of the communication. Most studies on the task-oriented communication were done in organizations, including the managers level (e. g., Hiltz, Turoff, & Johnson, 1989; McGuire et al., 1987). Other studies were done in school settings (e. g., Dubrovsky et al., 1991; Hollingshead, 1996). In terms of incentives for participation, student participants usually received either course credit (e. g., Connolly et al., 1990; Dubrovsky et al., 1991; Hollingshead, 1996; Valacich et al., 1992; Weisband, 1992), or received payments (e. g., Siegel et al., 1986; Weisband, 1992), while employees usually received payments (e. g., Hiltz et al., 1986; Siegel et al., 1986). In terms of anonymity, some studies involved anonymous communication (e. g., Valacich et al., 1992) while others did not (e. g., Hiltz et al., 1986). Still others involved both anonymous and non-anonymous communication (e. g., Connolly et al., 1990; Hiltz et al., 1989; Siegel et al., 1986).

Technology. According to Nunamaker et al. (1989), the type of technology is another factor in CMC environments. Most research on the task-oriented communication involved synchronous communication technology among groups (e. g., Hiltz et al., 1986; Hollingshead, 1996; Kiesler et al., 1985). Some research used either asynchronous communication technology (e. g., Siegel et al., 1986) or both asynchronous and

synchronous technologies (e. g., Siegel et al., 1986). The major technology formats used in research on the task-oriented communication include Interactive Converse Program (e. g., Kiesler et al., 1985; McGuire et al., 1987; Siegel et al., 1986), Computer Conferencing (CC) for Communication (e. g., Hiltz et al., 1986), Electronic Brainstorming System (EBS) (e. g., Connolly et al., 1990; Valacich et al., 1992), Electronic Information Exchange System (EIES) (e. g., Turoff, 1978), MM Mail Program (e. g., Weisband, 1992), Electronic Meeting Technology (EMT) (e. g., Dennis, Heminger, Nunamaker, & Vogel, 1990), and Group Decision Support Systems (GDSS) (e. g., Fulk, M. S., Holmes, M., Watson, R., DeSanctis, G., 1993; Poole, Holmes, Watson, & DeSanctis, 1993). These synchronous technologies require that participants be online and communicate in real time.

Procedure. The three aspects of procedure to be discussed are research methods, task characteristics, and experimental duration. Most research on the task-oriented communication in CMC environments involved controlled laboratory experiments (e. g., Connolly et al., 1990; Dubrovsky et al., 1991; Hollingshead, 1996; Kiesler et al., 1985; McGuire et al., 1987; Siegel et al., 1986; Valacich et al., 1992). However, some research on the task-oriented communication also involved either field experiments (e. g., Eveland & Bikson, 1988; Kiesler & Sproull, 1986; Savicki et al., 1996) or organizational case studies (e. g., Sproull & Kiesler, 1986). In addition, almost all the above studies were quantitatively oriented.

The second aspect is task characteristics. This is another factor in CMC environments (Nunamaker et al., 1989). Most research on the task-oriented communication involved one or more of the following areas: discussion of a series of

questions to get to know each other (e. g., Kiesler et al., 1985), group problem solving and decision making (e. g., Beckwith, 1987; Phillips, Santoro, & Kuehn,1988), decision making and idea generation (e. g., Connolly et al., 1990), choice-dilemma problems (e. g., Siegel et al., 1986; Weisband, 1992), homicide investigation tasks (e. g., Hollingshead, 1996), and risk decision making such as investment alternatives (e. g., McGuire et al., 1987). In addition, some used two contrasting types of tasks: the technical or information exchange tasks and the social-emotional or humanistic tasks (e. g., Hiltz et al., 1986).

The third aspect is experimental duration. Most research on the task-oriented communication in CMC environments involved a short period of experimental duration, mostly less than one hour. Specifically, experimental durations included 20 minutes in both FtF and CMC conditions (e. g., Kiesler et al., 1985), about 30 minutes in both CMC and FtF conditions (e. g., Connolly et al., 1990; Siegel et al., 1986), about 30 minutes in CMC environments (e. g., Valacich et al., 1992), about 45 minutes in both CMC and FtF conditions (e. g., Hollingshead, 1996), about 45 minutes in CMC environments (e. g., Herschel et al., 1994), and 60 or 90 minutes in both FtF and CC conditions (e. g., Hiltz et al., 1986). However, there are a few field experiments that extended experimental duration to as long as about three weeks (e. g., Savicki et al., 1996).

Major Findings

The findings of most earlier research and more recent research in CMC environments tend to be consistent with the model of the task-oriented communication. Major findings involved (a) equal participation (e. g., Dubrovsky et al., 1991; Gale et al., 1995; McLeod, 1992; Siegel et al., 1986; Spears & Lea, 1994; Warschauer, 1995/1996),

(b) uninhibited behavior (e. g., Dutton, 1996; Kiesler et al., 1985; Siegel et al., 1986), (c) increased quality of decision making (e. g., Connolly et al., 1990; Gale et al., 1995; Hollingshead, 1996; McLeod, 1992; Savicki et al., 1996), (d) increased time to reach a decision (e. g., McLeod, 1992; Siegel et al., 1986), and (e) depersonalization (e. g., Kiesler et al., 1985; McLeod, 1992).

Equal participation. Most research on the task-oriented communication has found equal participation in CMC environments. Dubrovsky et al., (1991) found that status and expertise inequalities in participation were strikingly reduced in CMC discussions. The significant feature is that both high and low-status members tended to be first advocates in CMC discussions. Equal participation was also found in other situations, including the second language classroom (Warschauer, 1995/1996).

Uninhibited behavior. Most research on the task-oriented communication has consistently found uninhibited behavior. Siegel et al. (1986) found that group members exhibited more uninhibited behavior, and included more inflammatory and strong expressions in CMC environments. Kiesler et al. (1984) found more uninhibited remarks in CMC than in FtF conferences, and more uninhibited remarks in anonymous CMC environments than non-anonymous CMC environments.

Increased quality of decision making. Most research on the task-oriented communication has found a higher quality of decision making in CMC environments than in FtF environments. Gale et al. (1995) found that the group support systems in CMC environments can improve brainstorming. Hollingshead (1996) found that the mixed-status group made worse decisions and referred less to critical information than equal-

status groups in both CMC and FtF environments. Valacich et al. (1992) found that larger groups generated significantly more and higher quality ideas than small groups.

Increased time to reach a decision. Most research on the task-oriented communication has found that CMC groups need a longer period of time to reach a decision and achieve consensus less often than FtF counterparts. Hiltz et al. (1986) found that participants were less likely to reach agreement in CMC environments. Other research also found that CMC groups reach consensus in decision making less often and take a longer period of time than FtF groups when the time is restricted (e. g., Hiltz, 1978a; Hiltz et al., 1986; Siegel et al., 1986).

Depersonalization. Most research on the task-oriented communication has found depersonalization effects in CMC environments. Kiesler et al. (1985) reported that they couldn't find any influence of CMC environments on physiological arousal, nor on emotions or self-evaluations. In addition, Kiesler et al. found that participants in CMC groups evaluated each other lower than those in FtF groups. From the perspective of Kiesler et al., CMC environments were impersonal.

The Social-emotion-oriented Model

Theoretical Foundations

Research on the social-emotion-oriented communication in CMC environments is primarily based on Social Information Processing Model proposed by Walther (1992b). This approach is based on principles in social cognition and interpersonal relationship development in social psychology. According to Walther, the Social Information Processing Model refers to the way in which communicators process relational and social identity cues using various media. Communicators who use any medium experience

similar needs for affinity and uncertainty reduction. To meet these needs, CMC participants will adapt their textual and linguistic behaviors to the presentation and solicitation of socially revealing and relational behavior. However, CMC's limited cues cause the medium to be unable to convey all the task-related and the social-emotion-related information within as little time as multichannel FtF environments. Therefore, the key difference between FtF and CMC environments is not a matter of capability, but a matter of rate. It can be inferred that the exchange of the social-emotional information in CMC environments may be slower than that of FtF environments, but it will be possible over time. Therefore, this theoretical approach can provide a basis for research in CMC environments.

Research Methodology

Participants. Most research on the social-emotion-oriented communication involved college students in school settings. The participants were typically new to each other before the experiments and were usually assigned numbers and were randomly assigned to either FtF or CMC conditions (e. g., Walther,1992a, 1994, 1995; Walther & Burgoon, 1992). Participants represented different majors and class levels. In most cases, participants had no history in using CMC environments (e. g., Walther,1992a, 1994; Walther & Burgoon, 1992). Some research also involved regular e-mail users (e. g., Walther & Tidwell, 1995). Other research involved participants in organizations (e. g., Rice, 1982, 1992; Rice & Aydin, 1991; Schmitz & Fulk, 1991). Mixed-gender groups of participants were employed in most studies (e. g., Adkins & Brashers, 1995; Walther, 1995; Walther & Burgoon, 1992). In addition, research on the social-emotion-oriented communication involved special populations such as emotionally disturbed adolescents

(Zimmerman, 1987). Similarly, participants in CMC environments received a short period of training about the use of communication technology before the experiment (e. g., Walther, 1992a, 1994, 1995).

The second major aspect is group size. In most research on the social-emotion-oriented communication in CMC environments, the participants were three-member groups (e. g., Adkins & Brashers, 1995; Lea & Spears, 1991; Walther,1992a, 1994, 1995, 1997; Walther & Burgoon, 1992), five-member groups (e. g., Smilowitz, Compton, & Flint, 1988), and six-member groups (e. g., Walther, 1997). However, research done in organizations involved large groups at a national level (e. g., Rice, 1982).

The third major aspect is group structure. Most studies on the social-emotion-oriented communication in CMC environments were done either in school settings (e. g., Walther,1992a, 1994; Walther & Burgoon, 1992) or in organizations (e. g., Rice, 1982, 1992; Rice et al., 1989; Rice & Aydin, 1991; Rice, Chang, & Torobin, 1992; Schmitz & Fulk, 1991). Other studies were done among family members (e. g., Kraut et al., 1998). In terms of incentives for participation, most students participated for course credit (e. g., Walther,1992a, 1994; Walther & Burgoon, 1992), while most employees participated without explicit incentives (e. g., Rice, 1982). In terms of the anonymity of communication, almost all studies were done anonymously across settings (e. g., Walther,1992a, 1994; Walther & Burgoon, 1992).

Technology. Most research on the social-emotion-oriented communication in CMC environments involved asynchronous communication technology. The most commonly used asynchronous CMC system was the Instructional Computer Conferencing System (ICOSY) (e. g., Rapaport, 1991; Smith, 1988; Walther, 1992a,

1995; Walther & Burgoon, 1992). Others included the Public Electronic Network (PEN) (e. g., Dutton, 1996; Wittig & Schmitz, 1996), Vaxnotes (e. g., Walther, 1994), EIES (e. g., Rice, 1982), Electronic Messaging Systems (e. g., Rice et al., 1989; Rice & Case, 1983), Bulletin Board System (BBS) (e. g., Danowski, 1982; Myers, 1987; Rice & Love, 1987), TeleNex (e. g., Tsui & Ki, 1996), and Internet (e. g., Katz & Aspden, 1997). These systems used an asynchronous text-based electronic communication. Communicators need not be on line simultaneously, but they could flexibly access the system and adapt their textual and linguistic contexts individually.

Procedure. In terms of research methods, most research on the social-emotion-oriented communication in CMC environments involved controlled laboratory experiments (e. g., Matheson & Zanna, 1988, 1990; Walther, 1994, 1995; Walther & Burgoon, 1992). Others involved field experiments (e. g., Kraut et al., 1998, Rice, 1992; Rice & Aydin, 1991; Rice et al., 1992; Rice & Love, 1987; Tsui & Ki, 1996; Walther, 1997), surveys (e. g., Dutton, 1996; Grabowski, Suciati, & Pusch, 1990; Katz & Aspden, 1997), and case studies (e. g., Dutton, 1996). Most of the above studies were quantitatively oriented, while a few were qualitatively oriented (e. g., Burge, 1994; Myers, 1987).

In terms of task characteristics, most research on the social-emotion-oriented communication in CMC environments involved decision-making tasks (e. g., Walther, 1992a, 1995; Walther & Burgoon, 1992), policy recommendations (e. g., Walther, 1995), academic policy dilemma tasks (e. g., Walther, 1994), controversial topics (e. g., Lea & Spears, 1991), problem-solving discussions (e. g., Matheson & Zanna, 1988, 1990), social support work (e. g., Wittig & Schmitz, 1996), topics about specific fields such as

the medical field (e. g., Rice & Love, 1987), explicit tasks to perform with or without deadlines (e. g., Rice, 1982), international collaborating group assignments (e. g., Walther, 1997), and the sending of electronic memos (e. g., Rice et al., 1992).

In terms of experimental duration, most research on the social-emotion-oriented communication in CMC environments used a longer period of experimental duration compared with research on the task-oriented communication (e. g., Freeman, 1980, 1984; Hiltz & Turoff, 1978; Iseke-Barnes, 1996; Phillips, 1982; Rice et al., 1989; Steinfield, 1986; Walther, 1992a, 1995; Walther & Burgoon, 1992). Experimental duration in the social-emotion-oriented communication in CMC environments varied, extending from about 10 minutes to as long as several years. Experimental duration included about 10 minutes for two topics for both CMC and FtF groups (e. g., Matheson & Zanna, 1990) and about 40 minutes for four topics in CMC environments (e. g., Lea & Spears, 1991). However, most research extended for several weeks. The experimental durations included three weeks in CMC environments (e. g., Walther, 1997), five weeks in both CMC environments and FtF conditions (e. g., Walther, 1992a), five weeks in CMC condition and 2 hours for FtF condition (e. g., Walther, 1992a, 1995), over six weeks in asynchronous CMC and FtF conditions (e. g., Walther, 1994), over six weeks in CMC environments (e. g., Rice & Love, 1987), over 11 months in asynchronous computer conferencing among clinically disturbed adolescents (e. g., Zimmerman, 1987), over 16 months in CMC environments (e. g., Tsui & Ki, 1996), one to two years Internet communication (Kraut et al., 1998), and over 2 years in CMC conditions in a national study (e. g., Rice, 1982).

Major Findings

The major findings of most research on the social-emotion-oriented communication in CMC environments tended to be consistent with the social-emotion-oriented model. Many recent studies have found that CMC environments can facilitate the social-emotional exchange between communicators. Such findings are related to a variety of the social-emotion-related topics such as (a) social and relational development (e. g., Beauvois & Eledge, 1995/1996; Burge, 1994; Freeman, 1980, 1984; Parks & Floyd, 1996; Rice, 1982; Rice & Aydin, 1991; Rice & Love, 1987; Tsui & Ki, 1996; Walther, 1992a, 1995, 1996; Walther & Burgoon, 1992; Zimmerman, 1987), (b) individuation (e. g., Lea & Spears, 1991; Matheson & Zanna, 1988, 1990; Myers, 1987; Smilowitz et al., 1988; Spears, Lea, & Lee, 1990; Walther, 1994), (c) impression development (Walther, 1993a, 1993b), and (d) humor (Baym, 1995).

Social and relational development. Most research on the social-emotion-oriented communication in CMC environments indicates that communicators may adapt their verbally transmitted or textual messages to accumulate social emotional and relational development. Walther (1992a) found that CMC groups showed greater intimacy and social-orientation than FtF groups over time. Walther (1995) found that CMC groups achieved higher levels on several dimensions of interpersonal communication than FtF groups. Walther and Burgoon (1992) found that CMC groups improved in some relational aspects and that these subsequent levels were very close to those of FtF groups. Some research even indicates that CMC environments have exceeded the level of affection and social-emotion of parallel FtF interaction. This surprising phenomenon is called "hyperpersonal communication" in CMC environments (Vergoth, 1995; Walther,

1996). In addition, social and relational development was found in a variety of settings, including family (e.g., Katz & Aspden, 1997), school (e. g., Tsui & Ki, 1996; Zimmerman, 1987), organizational settings (e. g., Rice, 1982), as well as social support work settings (e. g., Wittig & Schmitz, 1996).

Individuation. Some research on the social-emotion-oriented communication in CMC environments has found that participants in CMC environments are individuated. Matheson and Zanna (1988, 1990) found that CMC participants reported higher levels of private self-awareness and lower levels of public self-awareness. In addition, Smilowitz et al. (1988) replicated Asch's "majority against a minority of one" study in a CMC environment. Smilowitz et al. found that CMC environments seemed to reduce the effects of social pressures to conform to majority judgments. In CMC environments, participants tended to be more critical and more willing to assess the information they were receiving, compared with traditional FtF environments.

Impression development. Some research on the social-emotion-oriented communication in CMC environments has found that impression development can accumulate in CMC environments. Walther (1993a) constructed a unique quantitative measure of impression development used in CMC research. The measure predicted that impressions were expected to develop differentially over time. Walther (1993b) used this measure to examine the effects of time and CMC vs. FtF on the development of interpersonal impressions. Walther found that CMC communicators developed impressions of others gradually over several weeks, exhibiting a linear increase in impression development and reaching the level of FtF groups.

Humor. Some research on the social-emotion-oriented communication in CMC environments has indicated that humor can be accomplished in CMC environments. According to Baym (1995), humor can be accomplished in CMC environments and it can be important in creating social meaning online. Moreover, since humor depends on group norms, knowledge, problems, and practices, it provides a different way for CMC participants to solve problems within the group, to produce unique identities and individuality, and to create group solidarity and identity in CMC environments. This study implies that humor can be a particularly important locus of social information in CMC environments.

Similarities and Differences of Both Models

Research on the task-oriented communication and research on the social-emotion-oriented communication have both similarities and differences. The similarities are primarily shown in three aspects: research methods, participants' characteristics, and task characteristics. In terms of research methods, both models involved several common research methods, including controlled laboratory experiments, field experiments, and case studies. In terms of participants' characteristics, both models involved different group sizes, characteristics, settings, incentives for participation, as well as in either anonymous or identified environments. In terms of task characteristics, both models involved a variety of discussed topics, including decision making, choice dilemma tasks, and problem solving.

However, there are major differences between these two models. These differences are primarily shown in several major aspects, including (a) theoretical

foundations, (b) technology and experimental duration in research methodology, and (c) major findings. Here, the major focus is on the first two differences.

First, in terms of theoretical foundations, research on the task-oriented communication and research on the social-emotion-oriented communication are quite different. As stated previously, the former is primarily based on the "cues-filtered-out" theory, including Social Presence Theory, Media/Information Richness theory, and Social Context Cues Theory, while the latter is primarily based on Social Information Processing Model. The former model focused on the reduced social context cues of CMC environments, while the latter model emphasized relational cues and social identities by the use and adaptation of other devices, such as paralinguistic cues.

Second, in terms of experimental duration, research on the task-oriented communication and research on the social-emotion-oriented communication are different. The former tends to involve a short period of experimental duration, while the latter tends to involve a long period of experimental duration. Experimental durations may be an important factor affecting the major findings of CMC research. Fortunately, many researchers have noticed this (e. g., Walther, 1992a, 1992b; Williams, Rice, & Rogers, 1988). However, according to Walther, Anderson, and Park (1994), the influence of time on relational or the social-emotional communication is not fully investigated and understood although most of the social-emotion-oriented research in CMC environments is based on extended experimental durations.

Third, in terms of CMC technology, research on the task-oriented communication and research on the social-emotion-oriented communication are different. The former tends to involve synchronous communication technology, while the latter tends to involve

asynchronous communication technology. According to this review, technology systems may be another major factor affecting the major findings of CMC research.

Suggestions for Research

The task-oriented communication and the social-emotion-oriented communication are not a dichotomy; they lie at the opposing ends of a continuum. Therefore, a full and unbiased understanding of the nature of CMC environments requires that further CMC research be conducted with consideration of the following suggestions.

In terms of theoretical foundations, future CMC research should integrate "cues-filtered-out" theory and the Social Information Processing Model. Either of these two contrasting theories focuses on only one aspect of CMC environments. According to Nunamaker et al. (1989), if any single perspective is given too much authority, a distorted view of a complex phenomenon in CMC environments will occur. If the focus is on the integration of these two theories, research findings might be different.

In terms of technology, future CMC research should involve both synchronous and asynchronous CMC technologies across research settings. Research on the task-oriented communication is typically associated with synchronous technology, while research on the social-emotion-oriented communication is typically associated with asynchronous technology. If the focus is on a combination of these two technologies, research findings might be different.

In terms of research methods, future CMC research should include a variety of research methods. As stated previously, most research in the task-oriented model and the social-emotion-oriented model involved controlled laboratory experiments, field experiments, and case studies. According to Danowski (1982), research methods such as

network analysis, content analysis, and multidimensional scaling are especially suitable for CMC environments since they are sensitive and responsive to CMC's specific features. However, these methods are not extensively employed in previous CMC research. According to Campbell and Stanley (1963) and Denzin (1989), since different research methods are more or less vulnerable to different threats, the most valid studies are those that rely on several research methods, thus minimizing threats in as many strong ways as possible. Therefore, if several research methods are widely employed in future CMC research, research findings might be different. In addition, most previous CMC research in both models is quantitatively oriented, with very little research qualitatively oriented. Therefore, a multi-method, multi-trait approach to fully understanding how people communicate in CMC will be an urgent need (Rice, 1990). This multi-method, multi-trait approach will focus on a combination of research methods, as well as a combination of quantitative and qualitative methods. This new approach could enrich our understanding and provide a solid foundation for future CMC research.

In terms of experimental duration, future CMC research should allow enough time for CMC participants' communication and discussion. According to Walther (1992b), experimental durations may be an important factor for the impersonal findings in early CMC studies. These durations affect CMC and FtF groups differently. These two types of groups may behave differently at different stages in group relational development. If FtF and CMC groups were given equal experimental duration, it might produce unequal effects because CMC groups will take a longer period of time to exchange messages and accomplish tasks than their FtF counterparts. Therefore, future CMC research should allow CMC groups a longer period of time than FtF groups.

In terms of the communication settings, future CMC research should recruit participants from a variety of settings, including not only school and organizational settings, but also other settings such as family and personal communication settings. Most previous research in the task-oriented model and the social-emotion-oriented model primarily involves two major settings: school and organizational settings. Since the school and organizational settings are very limited, research from these two major settings will have problems in generalizing the results to other settings. Therefore, future CMC research should recruit participants from a variety of settings.

In terms of data systems, future CMC research should use an integration of both verbal and nonverbal data. According to Walther (1992b), one of the four limitations of prior CMC research is verbal-only data that is related to the nature of the data collected during research studies. Most CMC research involves only verbal comments from transcripts. Very little CMC research has examined nonverbal behaviors. This limitation has not changed much since Walther's 1992 paper. Most current CMC research in both the task-oriented communication and the social-emotion-oriented communication still focuses on the effects of verbal cues (e. g., Adkins & Brashers, 1995; Parks & Floyd, 1996; Parks & Walther, 1996). Therefore, future CMC research should integrate both verbal data and nonverbal data for research analysis.

In addition, future CMC research should recruit participants with a variety of CMC experiences. Most previous research in the task-oriented model and the social-emotion-oriented model involves novice participants with no history in CMC. Very little research in both models involves experienced CMC users. This limitation will also have problems in generalizing the results to other populations since more and more people

have some kind of experiences in CMC. Therefore, future CMC research should take into account the participants' various experience levels.

Finally, in terms of ethical issues, future CMC research should maintain the participants' privacy and equity. Ethical issues are a very important aspect in any type of research related to human or animal subjects. Since CMC environments are different from traditional FtF environments, ethical issues in CMC environments are accordingly different and appear increasingly important to future CMC researchers. The two most important issues identified are privacy and equity in CMC (e. g., Iseke-Barnes, 1996; Rice, 1990).

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